

FOREGS GEOCHEMICAL BASELINE MAPPING PROGRAMME: ITALIAN TERRITORY

De Vivo B.⁽¹⁾, Lima A.⁽¹⁾, Boni M.⁽¹⁾, Albanese S.⁽¹⁾, Cicchella D.⁽¹⁾, Iachetta A.⁽¹⁾, Malanga F.⁽¹⁾, Somma R.⁽¹⁾, Tarzia M.⁽¹⁾, Frizzo P.⁽²⁾, Raccagni L.⁽²⁾, Sabatini G.⁽³⁾, Baroni F.⁽³⁾, Di Lella L.A.⁽³⁾, Protano G.⁽³⁾ and Riccobono F.⁽³⁾

KEY WORDS: *Geochemical baselines, FOREGS, geochemical mapping.*

FOREGS project, aimed at the compilation of the geochemical mapping of Europe, is part of the global project of the International Union of Geological Survey/International Association of Geochemistry and Cosmochemistry (IUGS/IAGC) 360 [1], also known as Global Geochemical Baseline project. This project aims to realize the recommendations of the International Geological Correlation Project (IGCP) 259 [2].

The IGCP 259 recommended the collection of a global reference set of materials. The samples should be collected following predefined, systematic methods and consistently analyzed in designated laboratories. In this way, a global geochemical database set on a global reference network (GRN) could be created, to provide a reference against which existing national and regional geochemical datasets could be compared. These recommendations were endorsed by the U. N. Committee on Natural Resources, which stated that a global database had to be created, with the Global Geochemical Baselines project as a core of the programme.

The regulations of IGCP 259 were reinforced by the FOREGS Geochemistry Task Force, which was established by the main European Geological Surveys in order to make an inventory of geochemical database in European countries. The recommendations for the sampling methods as well for analyses and data processing described in Darnley et al. [2], were expanded by Salminen et al. [3], who compiled a detailed sampling manual for temperate regions.

In order to draw systematic international geochemical mapping, the geochemical reference network (GRN) covers the earth globe with a grid of cells (160 x 160 km), within which 5 random sampling sites are fixed. At global scale the GRN samples has been completed, so far, for China, parts of Russia and Europe. Within the FOREGS project, in accordance with the Global Geochemical Baselines [2], the following media had to be sampled: stream water, stream sediments, residual soils (upper and lower horizons), humus, overbank and flood plain sediments.

For Italy, due to the fact that the Servizio Geologico Nazionale (National Geological Survey) had not the personnel to carry out the sampling of the GRN cells, and the economic capability to cover

the analytical costs generated for the cells of the whole territory, the sampling has been performed by research groups of the Universities of Napoli Federico II (Prof. B. De Vivo), Padova (Prof. P. Frizzo) and Siena (Prof. G. Sabatini). The funds for the analytical costs have been partly covered by the Progetto Strategico "Carta Geochimica d'Italia" (1997 - 1999) of CNR (Consiglio Nazionale delle Ricerche)

The above mentioned three groups have sampled, 19 cells in Italy, distinguished as follows: 3 cells in northern Italy by University of Padova, 2 cells in central-northern Italy by University of Siena and 14 cells in central-southern Italy and islands by University of Napoli Federico II. In addition to the above 19 cells, other samples have been collected from few sites in a cell of Liguria region by University of Genova (the authors of this abstract are not aware of the details of this latter sampling). Seven cells of the 19, located from central to northern Italy, have been sampled as dictated by FOREGS project, i.e., samples of the selected media have been taken in 5 random sampling sites; in the other 12 cells from southern Italy and islands, the samples have been collected in one or two sites per cell only, because portions of the cells were in the sea.

In each sampling site 5 types of samples have been taken: stream water, stream sediments, overbank and flood plain sediments, top and bottom soils, humus. The collected samples, after being prepared at Geological Survey of Slovak Republic GSSR), have been analyzed with different methods (ICP-MS, TOC/ions, XRF, ICP-AES, etc.) at BGR (Geological Survey of Germany), NITG-TNO (Netherlands Institute of Applied - National Geological Survey), BGS (British Geological Survey), GTK (Geological Survey of Finland), BRGM (Bureau de Recherches Géologiques et Minières, France), MAFI (Geological Survey of Hungary), PIG (Polish Geological Institute) and NGU (Geological Survey of Norway).

Once the geochemical maps of the entire Europe will be published in 2004 by the FOREGS project, the detailed geochemical maps of Italy, obtained from the single sampled media, will be published, a report containing the geology, the soil profiles, the stream and overbank/floodplain sediments description of each sampled site. The maps and the attached report will be accompanied by a database containing all the analytical data, and will be available to the national and international

⁽¹⁾ Dipartimento di Geofisica e Vulcanologia, Via Mezzocannone 8, 80134 Napoli, Italy.

⁽²⁾ Dipartimento di Mineralogia e Petrologia, Corso Garibaldi 37, 35137 Padova, Italy.

⁽³⁾ Dipartimento di Scienze Ambientali - Sezione di Geochimica Ambientale, Via del Laterano 8, 53100 Siena, Italy.

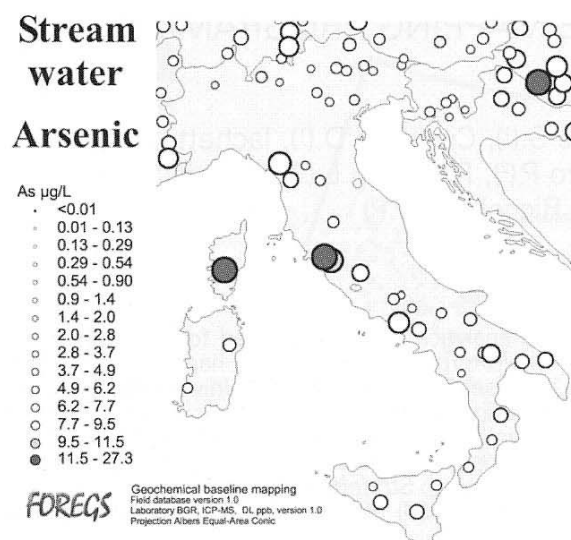


Figure 1 - Arsenic concentrations in filtered stream water samples.

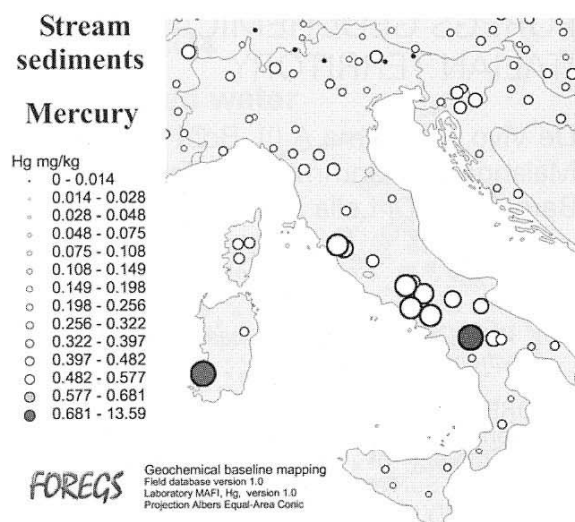


Figure 2 - Mercury concentrations in stream sediment samples.

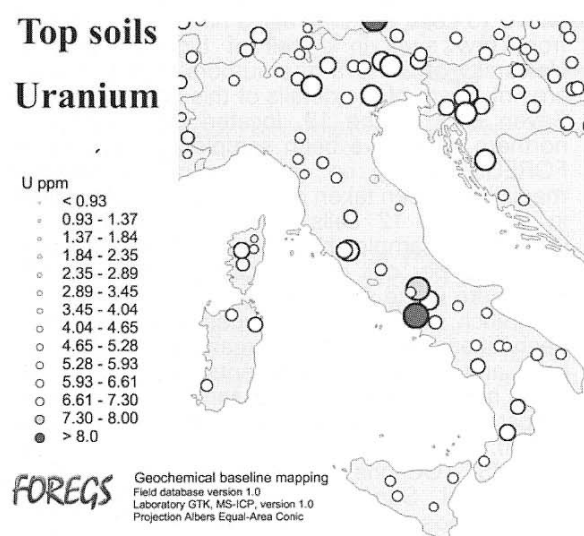


Figure 3 - Uranium concentrations in top soil samples.

researchers community and to Authorities interested to have access both to the geochemical data and the compiled geochemical maps. As for the entire Europe, at national and regional level, region-

al to national systematic baseline geochemical data are in fact an useful tool to provide a mean of monitoring the state of the environment and identifying potentially problematic areas.

In the figures 1, 2 and 3 are given examples of element concentrations in stream water, stream sediment and top soil samples taken in the Italian GRN cells.

REFERENCES

- [1] PLANT J., SMITH D., SMITH B. & WILLIAMS L., 2001. Environmental geochemistry at the global scale. *Applied geochemistry*, 16: 1291 - 1308.
- [2] DARNLEY A.G., BJORKLUND B., GUSTAVSSON N., KOVAL P.V., PLANT J., STEENFELT A., TAUCHID T.M. & XIE X.J., 1995. A Global Geochemical Database for environmental and resource management. Recommendations for international geochemical mapping. Earth Science Report 19, UNESCO Publishing, Paris.
- [3] SALMINEN R., TARVAINEN T., DEMETRIADES A., DURIS M., FORDYCE F.M., GREGORAUSKIENE V., KAHRELIN H., KIVISILLA J., KLAVER G., KLEIN H., KARLON J.O., LIS J., LOCUTURA J., MARSINA K., MJARTANOVA H., MOUVET C., O'CONNOR P., ODORL T., OTTONELLO G., PAUKOLA T., PLANT J.A., REIMANN C., SCHERMANN O., SIEWERS J., STEENFELT A., VAN DER SLUYS J., DE VIVO B. & WILLIAMS L., 1998. FOREGS Geochemical Mapping Field Manual. Geological Survey of Finland, Guide 47.